

# Why Lectures Seem to Last Forever

Michael S. Rosenberg, Arizona State University

Ever wonder why even the shortest lecture or seminar seems to last much longer than it should? Why your watch seems to stop working the instant the lights dim and the monotone begins? Careful analysis has shown this to be a direct result of the time dilation principle of the special theory of relativity (Einstein 1905).

The length of a lecture according to your mind is dependent on the confusion-boringness factor  $\nu$ . An exact formula for this value is beyond the scope of this work, but it essentially represents **the relative speed at which your brain can absorb the lecture material versus the speed at which it is presented, corrected by the level of boredom generated by the lecture style and material.**

Large values of  $\nu$  indicate material which is being presented very quickly or is very boring. Careful empirical analysis has indicated that for typical large freshman lectures,  $\nu$  is approximately  $0.90c$  (where  $c$  is the speed of light); for departmental seminars,  $\nu$  is approximately  $0.75c$ ; and for standard conference presentations,  $\nu$  is approximately  $0.80c$ .

Because your knowledge is remaining relatively stationary while the lecture is shooting ahead astronomically, you view the lecture from a different reference frame than it actually occupies. Since the actual time ( $\Delta T'$ ) is measured by the lecturer, the apparent length of time according to your mental reference frame ( $\Delta T$ ) dilates and becomes longer than the actual time. According to the relativity equation:

$$\Delta T = \frac{\Delta T'}{\sqrt{1 - \nu^2/c^2}}$$

Table 1 lists typical examples of time dilation that one may encounter. Note that  $\nu$  **could be an imaginary number in the imaginary case that one actually finds a lecture interesting. In that case, time would seem to shrink and the lecture would appear quicker.** As we look back on 100 years of Einstein's theory, we continue to be amazed at its practical application to everyday events.

Situation	Confusion-Boringness ( $\nu$ )	Actual Lecture Time ( $\Delta T'$ )	Apparent Lecture Time ( $\Delta T$ )
Large freshman lecture	$0.90c$	1 hour, 20 min.	3 hours, 4 minutes
Departmental seminar	$0.75c$	50 minutes	1 hour, 16 minutes
Conference presentation	$0.80c$	15 minutes	25 minutes

Table 1. Examples of typical mental time dilation events.

## Reference

Einstein, A. 1905. Zur Elektrodynamik bewegter Körper. *Annalen der Physik* 17:891-921.